

PROJECT NAME
NUCLEUS

BASED ON
Colorsound Power Booster

EFFECT TYPE
Boost / drive

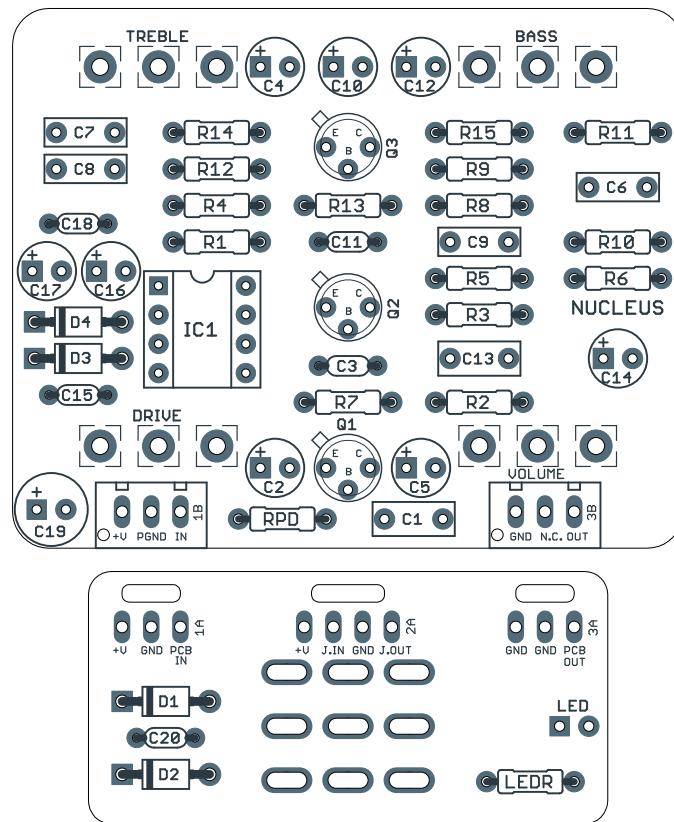
AION
DIY GUITAR EFFECTS

BUILD DIFFICULTY
Intermediate

DOCUMENT VERSION
1.0.1 (2020-07-20)

PROJECT SUMMARY

A reproduction of a boost pedal from the early 1970s that featured a two-band tone stack.



Actual size is 2.3" x 1.86" (main board) and 1.78" x 0.86" (bypass board).

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INTRODUCTION

The Nucleus Vintage Boost is a clone of the Colorsound Power Booster, a transistor-based boost/drive pedal with 2-band tonestack that was first sold in 1970 by the Macaris music store in London.

The Power Booster ran at 18V using two batteries in series. There were two versions, an “early version” and a “later version”, with some minor part differences between them. (See build notes for differences.)

The Colorsound Overdriver was an updated version of this circuit, a third revision from 1972, that dropped the power requirement down to a single battery. The Overdriver is available as another project, called the Plasma.

The Nucleus is a direct clone of the Power Booster that allows you to build either the early version or late version, with the addition of an output volume control which the original unit was sorely lacking. This way you can set the gain according to the tone you want without being tied to the volume that is produced along with it.

It also includes an on-board charge pump for 18V operation from a normal 9V supply so you don’t need to hunt down an 18V adapter for correct operation.

USAGE

The Nucleus has two controls and one toggle:

- **Gain** controls the amount of gain from the first transistor stage.
- **Treble** controls the high-end response of the circuit and forms half of the Baxandall tone stack.
- **Bass** controls the low-end response of the circuit and forms the other half of the Baxandall tone stack.
- **Volume** is the output volume of the effect.

PARTS LIST

This parts list is also available in a spreadsheet format which can be imported directly into Mouser for easy parts ordering. Mouser doesn't carry all the parts—notably potentiometers—so the second tab lists all the non-Mouser parts as well as sources for each.

[View parts list spreadsheet →](#)

PART	VALUE	TYPE	NOTES
R1	120k	Metal film resistor, 1/4W	
R2	150k	Metal film resistor, 1/4W	
R3	4k7	Metal film resistor, 1/4W	
R4	1k8	Metal film resistor, 1/4W	
R5	470R	Metal film resistor, 1/4W	
R6	1k2	Metal film resistor, 1/4W	
R7	12k	Metal film resistor, 1/4W	
R8	4k7	Metal film resistor, 1/4W	
R9	4k7	Metal film resistor, 1/4W	
R10	39k	Metal film resistor, 1/4W	
R11	5k6	Metal film resistor, 1/4W	
R12	180k	Metal film resistor, 1/4W	
R13	33k	Metal film resistor, 1/4W	
R14	3k9	Metal film resistor, 1/4W	
R15	1k	Metal film resistor, 1/4W	
RPD	2M2	Metal film resistor, 1/4W	Input pulldown resistor. Can be as low as 1M.
LEDR	4k7	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	220n	Film capacitor, 7.2 x 2.5mm	
C2	22uF	Electrolytic capacitor, 5mm	
C3	220pF	MLCC capacitor, NP0/COG	
C4	10uF	Electrolytic capacitor, 5mm	Use 4.7uF for early version.
C5	22uF	Electrolytic capacitor, 5mm	
C6	100n	Film capacitor, 7.2 x 2.5mm	
C7	10n	Film capacitor, 7.2 x 2.5mm	
C8	10n	Film capacitor, 7.2 x 2.5mm	
C9	100n	Film capacitor, 7.2 x 2.5mm	
C10	22uF	Electrolytic capacitor, 5mm	
C11	100pF	MLCC capacitor, NP0/COG	
C12	10uF	Electrolytic capacitor, 5mm	Use 4.7uF for early version.
C13	220n	Film capacitor, 7.2 x 2.5mm	Omit for early version.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C14	OMIT		Use 4.7uF for early version.
C15	470n	MLCC capacitor, X7R	
C16	10uF	Electrolytic capacitor, 5mm	
C17	10uF	Electrolytic capacitor, 5mm	
C18	470n	MLCC capacitor, X7R	
C19	100uF	Electrolytic capacitor, 6.3mm	
C20	100n	MLCC capacitor, X7R	
D1	1N5817	Schottky diode, DO-41	
D2	1N4742A	Zener diode, 12V, DO-41	
D3	1N5817	Schottky diode, DO-41	
D4	1N5817	Schottky diode, DO-41	
Q1	2N5088	BJT transistor, NPN, TO-92	Original units used BC109, BC169C, BC184C or BC184L. These are all high-gain transistors (hFE 400+). 2N5088 is a suitable low-noise and commonly-available replacement. See build notes for more info.
Q2	2N5088	BJT transistor, NPN, TO-92	
Q3	2N5088	BJT transistor, NPN, TO-92	
IC1	TC1044SCPA	Charge pump, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
BASS	100kB	16mm right-angle PCB mount pot	
DRIVE	1kC	16mm right-angle PCB mount pot	Original uses 10kB, but 1kC will provide a much more usable control.
TREBLE	100kB	16mm right-angle PCB mount pot	
VOL.	100kA	16mm right-angle PCB mount pot	
LED	5mm	LED, 5mm, red diffused	
IN	1/4" stereo	1/4" phone jack, closed frame	Switchcraft 112BX or equivalent.
OUT	1/4" mono	1/4" phone jack, closed frame	Switchcraft 111X or equivalent.
DC	2.1mm	DC jack, 2.1mm panel mount	Mouser 163-4302-E or equivalent.
BATT	Battery snap	9V battery snap	Optional. Use the soft plastic type—the hard-shell type will not fit.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

BUILD NOTES

Transistor outlines

The PCB has outlines for TO-18 (metal can). The BC109C is TO-22, but the other recommended types are TO-92. If using TO-92 transistors, you'll need to bend the center leg to fit the triangle shape.

Be careful of the pinout. For TO-92 transistors, the USA "2N" types are typically 180 degrees rotated from the European "BC" types. Always check the datasheet to confirm, and line them up to the pads marked "B", "C", and "E" on the PCB.

If your unit makes no sound when first powered up, the transistor orientation is the most likely reason.

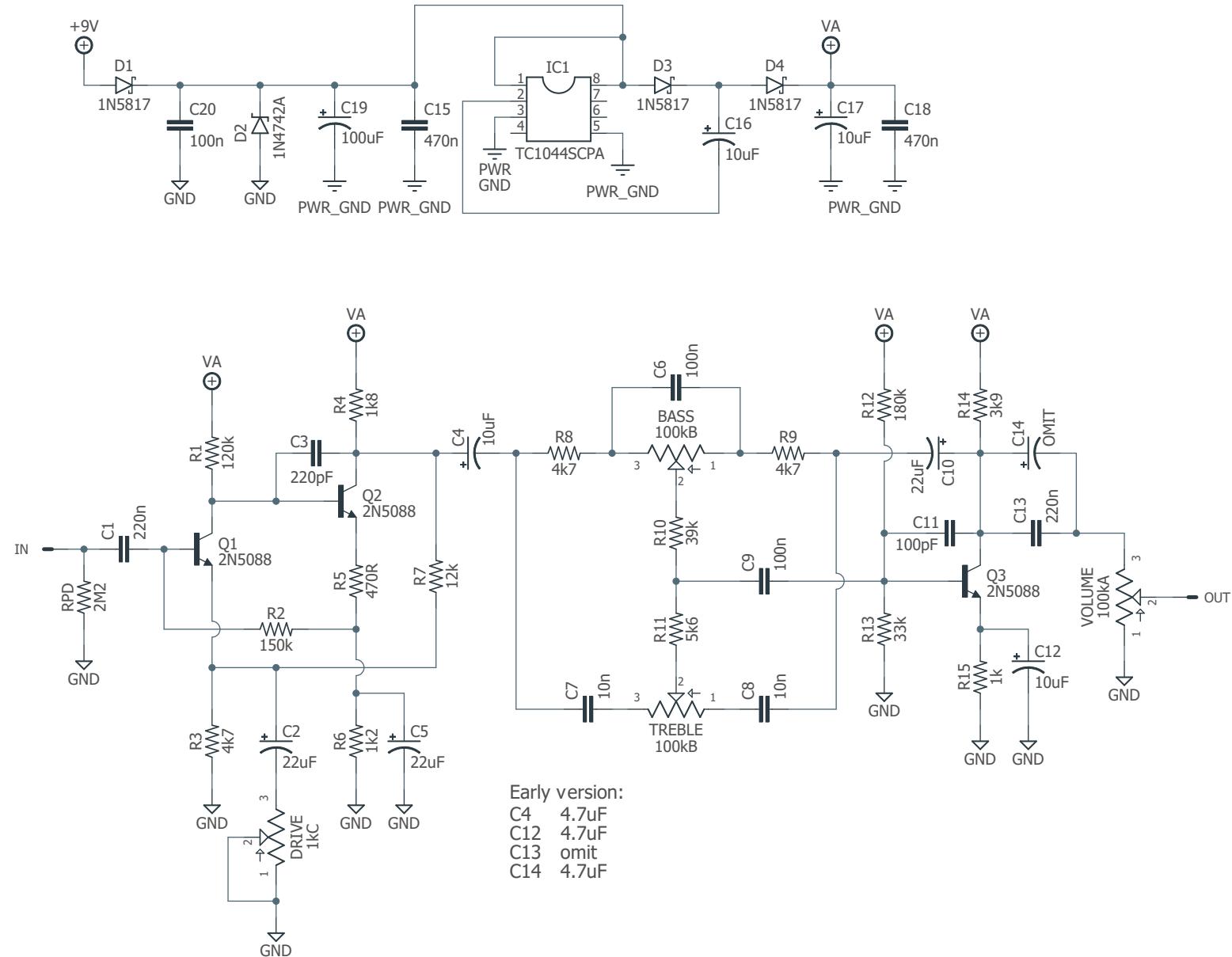
Versions

The Power Booster had one minor revision during its production run. It's not known exactly when the change took place or for what reason, but the following parts were changed.

PART	EARLY VERSION	LATE VERSION
C4	4.7uF	10uF
C12	4.7uF	10uF
C13	OMIT	220n
C14	4.7uF	OMIT

The main parts list and schematic for this project show the late version, which is the more commonly-seen variant.

SCHEMATIC



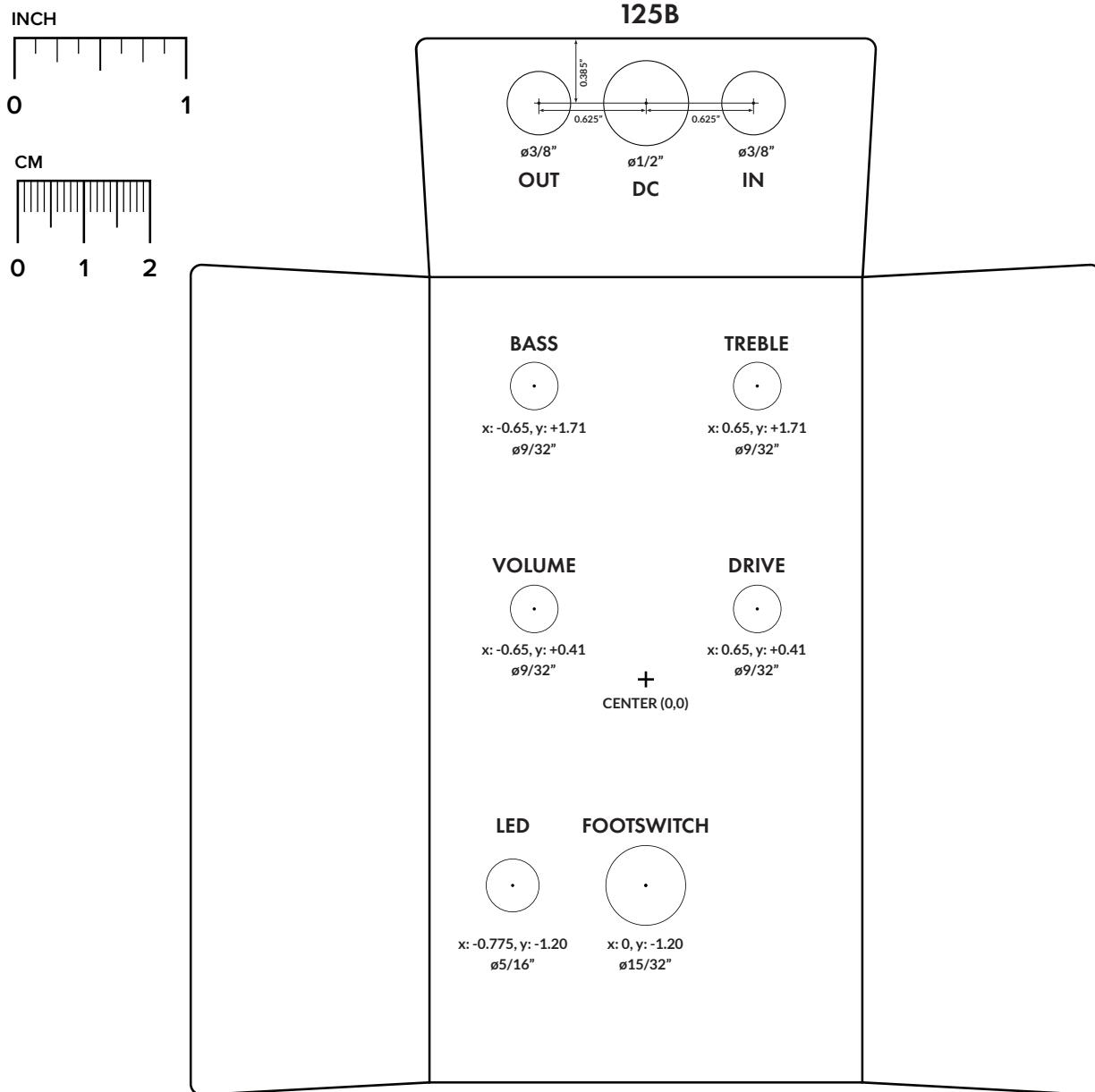
DRILL TEMPLATE

Cut out this drill template, fold the edges and tape it to the enclosure. Before drilling, it's recommended to first use a center punch for each of the holes to help guide the drill bit.

Ensure that this template is printed at 100% or "Actual Size". You can double-check this by measuring the scale on the printed page.

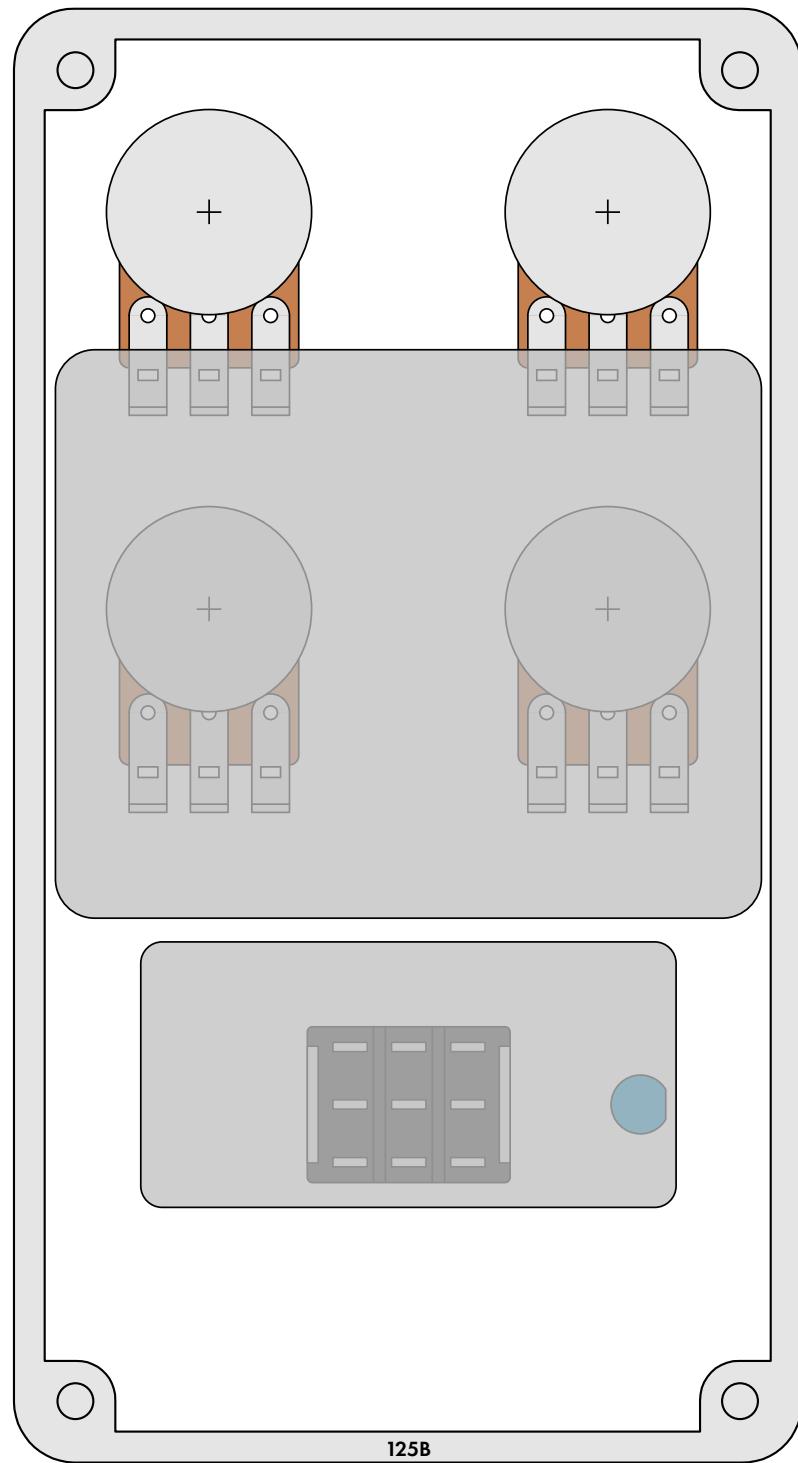
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the [Open-Frame Jack Drill Template](#) for the top side.

LED hole drill size assumes the use of a [5mm LED bezel](#), available from several parts suppliers. Adjust size accordingly if using something different, such as a 3mm bezel, a plastic bezel, or just a plain LED.

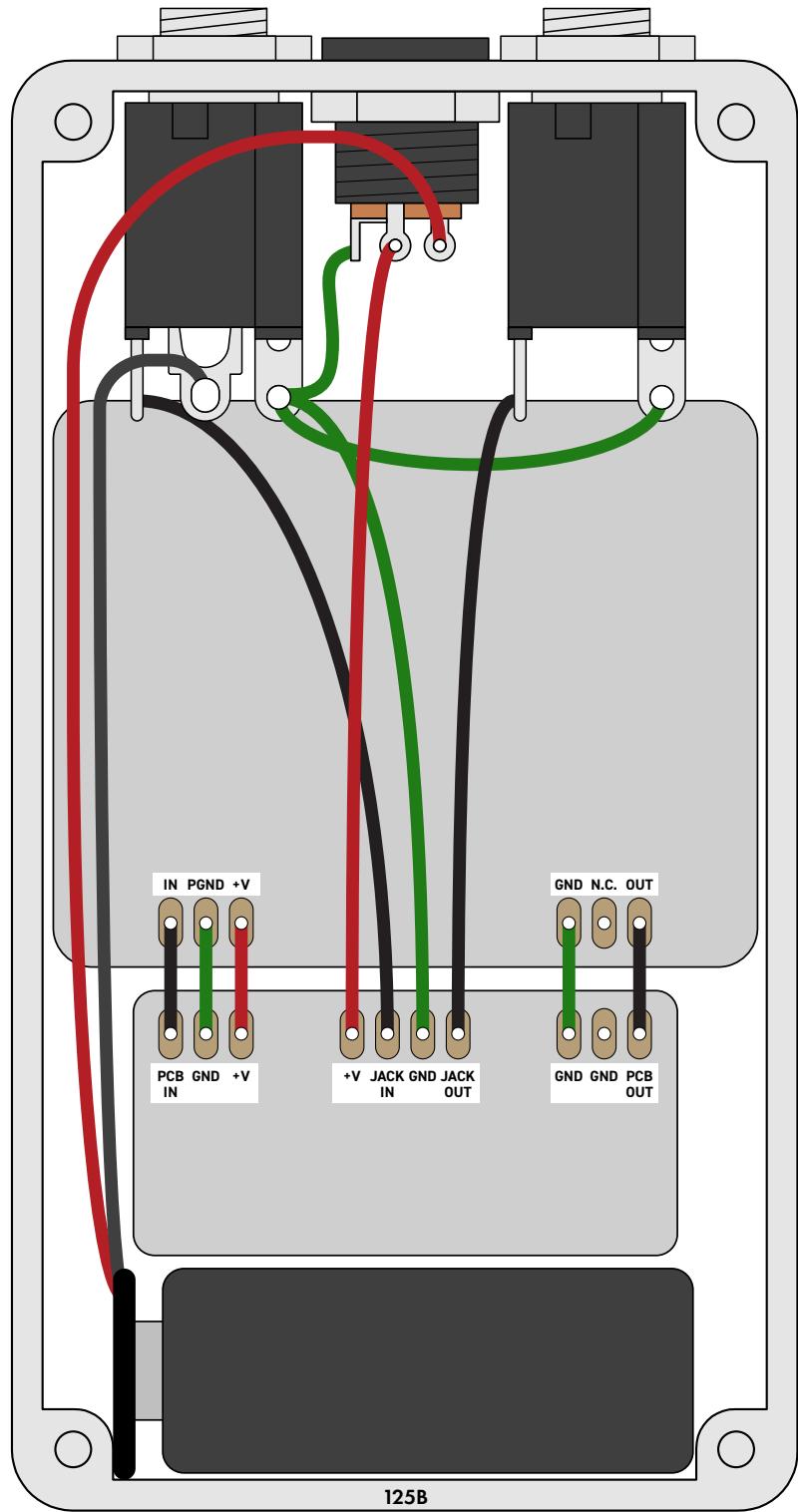


ENCLOSURE LAYOUT

Enclosure is shown without jacks. See next page for jack layout and wiring.



WIRING DIAGRAM



Shown with optional 9V battery. If battery is omitted, both jacks can be mono rather than one being stereo.
Leave the far-right lug of the DC jack unconnected.

LICENSE & USAGE

No direct support is offered for these projects beyond the provided documentation. It's assumed that you have at least some experience building pedals before starting one of these. Replacements and refunds cannot be offered unless it can be shown that the circuit or documentation are in error.

All of these circuits have been tested in good faith in their base configurations. However, not all the modifications or variations have necessarily been tested. These are offered only as suggestions based on the experience and opinions of others.

Projects may be used for commercial endeavors in any quantity unless specifically noted. No attribution is necessary, though a link back is always greatly appreciated. The only usage restrictions are that **(1) you cannot resell the PCB as part of a kit without prior arrangement, and (2) you cannot “goop” the circuit, scratch off the screenprint, or otherwise obfuscate the circuit to disguise its source.** (In other words: you don't have to go out of your way to advertise the fact that you use these PCBs, but please don't go out of your way to hide it. The guitar effects industry needs more transparency, not less!)

DOCUMENT REVISIONS

1.0.1 (2020-07-20)

Added missing D2-D4 to parts list.

1.0.0 (2020-07-03)

Initial release.